$1.50

Simpson

INSTRUMENTS THAT STAY ACCURATE

OPERATOR'S MANUAL

SIMPSON 260®-6XL AND 6XLM VOLT-OHM-MILLIAMMETER

260® Is a Registered Trademark of The Simpson Electric Company

WARNING

For safe usage, it is essential that the operator read this manual carefully before using the instrument for any measurements.

SIMPSON ELECTRIC COMPANY

853 Dundee Ave., Elgin, Illinois 60120
Area Code 312, Telephone 697-2260
In Canada, Bach-Simpson, Ltd., London, Ontario

Warranty

SIMPSON ELECTRIC COMPANY warrants each instrument and other articles of equipment manufactured by it to be free from defects in material and workmanship under normal use and service, its obligation under this warranty being limited to making good at its factory any instrument or other article of equipment which shall within 90 days after delivery of such instrument or other article of equipment to the original purchaser be returned intact to it, or to one of its authorized service stations, with transportation charges prepaid, and which its examination shall disclose to its satisfaction to have been thus defective; this warranty being expressly in lieu of all other warranties expressed or implied and of all other obligations or liabilities on its part, and SIMPSON ELECTRIC COMPANY neither assumes nor authorizes any other persons to assume for it any other liability in connection with the sale of its products.

This warranty shall not apply to any instrument or other article of equipment which shall have been repaired or altered outside the SIMPSON ELECTRIC COMPANY factory or authorized service stations, nor which has been subject to misuse, negligence or accident, incorrect wiring by others, or installation or use not in accord with instructions furnished by the manufacturer.

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KATY INDUSTRIES
ELECTRICAL EQUIPMENT GROUP

OPERATOR'S MANUAL

SIMPSON 260 6XL AND 6XLM VOLT-OHM-MILLIAMMETERS

This symbol on the nameplate means the product is Listed by Underwriters Laboratories Inc.

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LIST OF ILLUSTRATIONS

NOTE

This Operator's Manual contains information essential to the operation of these Instruments. It must be kept with the instrument at all times and not misplaced or discarded.

SAFETY SYMBOLS

This marking adjacent to another marking or a terminal or operating device indicates that the Operator must refer to an explanation in the Operating Instructions to avoid damage to the equipment and/or to avoid personal injury.

WARNING

The WARNING sign denotes a hazard. It calls attention to a procedure, practice, or the like, which if not correctly performed or adhered to, could result in personal injury.

CAUTION

The CAUTION sign denotes a hazard. It calls attention to an operating procedure, practice, or the like, which if not correctly adhered to could result in damage to or destruction of part or all Instrument.

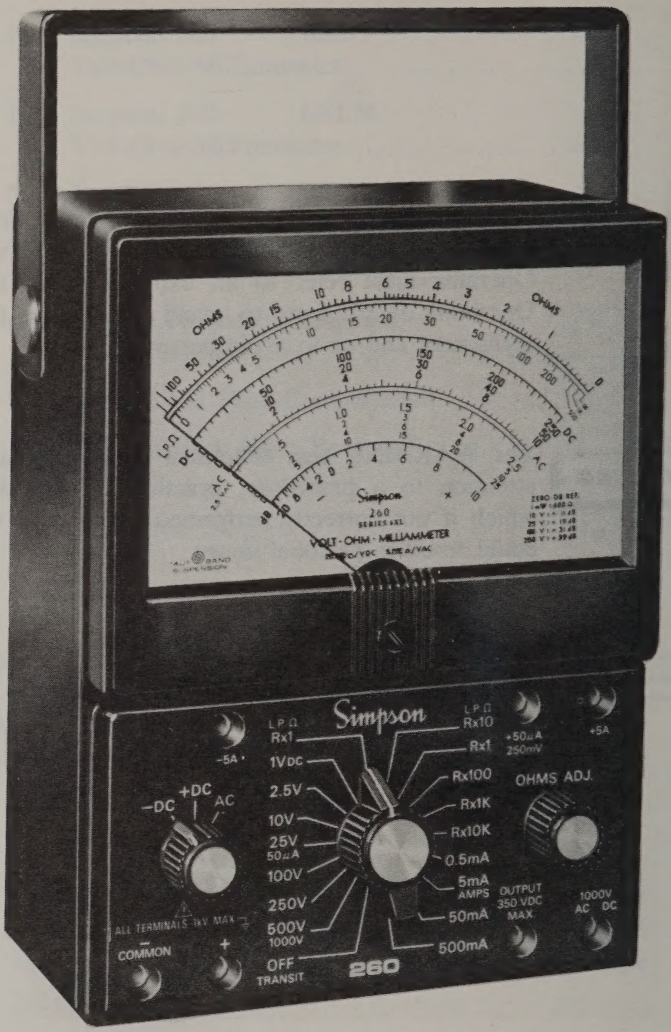

Figure 1-1. Simpson 260-6XL Volt-Ohm-Milliammeter

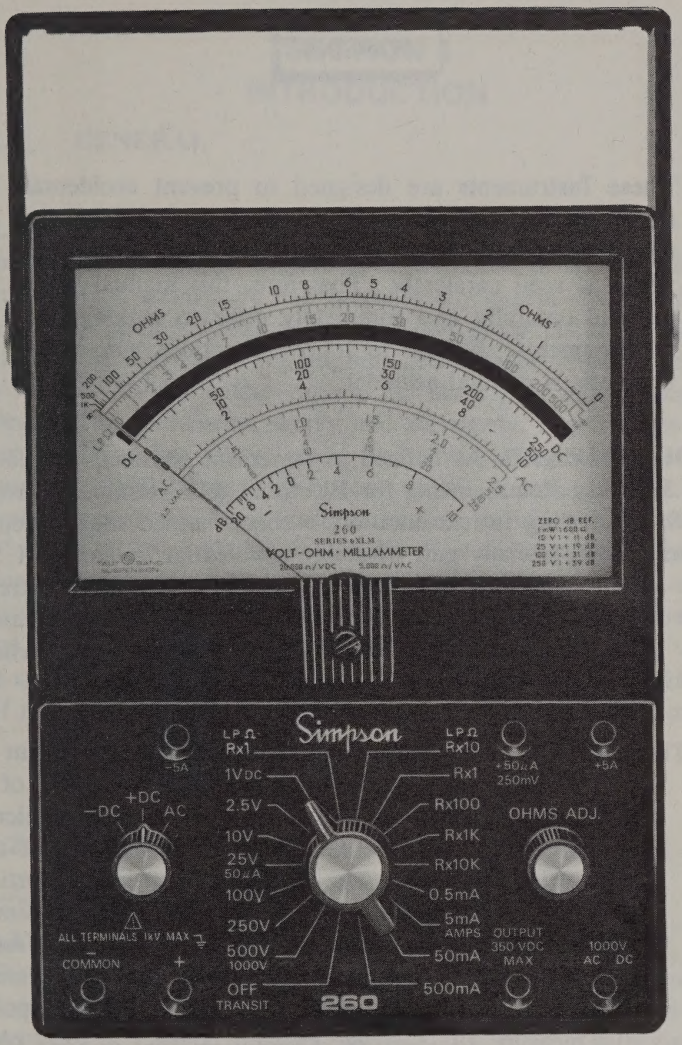

Figure 1-2. Simpson 260-6XLM Volt-Ohm-Milliammeter

WARNING

These Instruments are designed to prevent accidental shock to the operator when properly used. However, no engineering design can render safe an instrument which is used carelessly. Therefore, this manual must be read carefully and completely prior to making any measurements. Failure to follow directions can result in a serious or fatal accident.

SHOCK HAZARD: As defined in American National Standard, C39.5, Safety Requirements for Electrical & Electronic Measuring & Controlling Instrumentation, a shock hazard shall be considered to exist at any part involving a potential in excess of 30 volts rms or 42.4 volts DC or peak, and where a leakage current from that part to ground exceeds 0.5 milliampere, when measured with an appropriate measuring instrument defined in Section 11.6.1 of ANSI C39.5.

NOTE: The proper measuring instrument for the measurement of leakage current consists essentially of a network of a 1500 ohm non-inductive resistor shunted by a 0.15 microfarad capacitor connected between the terminals of the measuring instrument. The leakage current is that portion of the current that flows through the resistor. The Simpson Model 229-Series 2 AC Leakage Current Tester meets the ANSI C39.5 requirements for the measurement of AC leakage current and can be used for this purpose. To measure DC Leakage current, connect a 1500 ohm non-inductive resistor in series with the 260 1mA range and use this as the measuring instrument.

SECTION I
INTRODUCTION

1.1 GENERAL

1.1.1 The Simpson Volt-Ohm-Milliammeters 260 Series 6XL and 6XLM (hereafter referred to as the 260 s or the Instrument) are identical electrically and mechanically except that the Series 6XLM is equipped with a mirrored dial to eliminate parallax.

1.1.2 The 260 s are rugged, high performance, battery-operated Volt-Ohm-Milliammeters capable of making a wide variety of electrical measurements simply and accurately. Features are conventional and low power ohms, and a wide range coverage. The cases are made from high-impact (ABS) plastic, and are contemporarily styled. These features, in combination with the extended range coverage (Table 1-1), make these Instruments general-purpose portable or laboratory Instruments. They are well-suited to servicing, production, inspection, and engineering applications.

1.1.3 The 260 s utilize the Simpson taut-band movement, which is self-shielding. The taut-band suspension provides a high degree of repeatability and are highly resistant to shock or vibration.

1.2 DESCRIPTION

1.2.1 Instrument Case

1.2.2 A handle is attached to the side of the Instrument case. The handle may be used to support the Instrument in a convenient, sloping position for easy viewing. The Instrument case can also be placed in either a vertical or horizontal position. The horizontal position is preferable for greater accuracy since the Instrument is calibrated in this position.

1.2.3 Test Leads

1.2.4 Each Instrument is furnished with one pair of test leads four feet long. For polarity identification, one lead is black and the other red. The test lead wire consists of a large number of fine strands to ensure flexibility.

1.2.5 The insulation of the wire is high-grade rubber and is more than adequate for the highest voltage the Instrument is intended to measure. The red and black test leads have probe tips which are threaded near the base. The alligator clips may be screwed on or off either test lead to provide a probe or a clip for the operator's convenience.

1.3 ACCESSORIES AND SUPPLIES

1.3.1 All accessories and supplies required for the operation of the 260 s are furnished with each instrument, and listed in the accompanying Table 1-2. (Replacement parts are listed in Table 5-1.)

1.4 TECHNICAL DATA

1.4.1 Table 1-1 lists the technical specifications for the Simpson 260-6XL and 6XLM Volt-Ohm Milliammeters.

NOTE: Accuracy specifications apply to measurements made with the Instrument in a horizontal position (meter facing upward). Reference Conditions: +25 C ±5 C; 45% to 75% relative humidity.

Table 1-1. Technical Data

1. **DC Voltage:**

Ranges (full scale):	250 mV, 1.0V, 2.5V, 10V, 25V, 100V, 250V, 500V, and 1000V
Accuracy:	±2% of full scale on all ranges
Sensitivity:	20,000 ohms/volt

2. **AC Voltage:**

Ranges (full scale):	2.5V, 10V, 25V, 100V, 250V, 500V, and 1000V
Accuracy:	±3% of full scale on all ranges
Sensitivity:	5000 ohms/volt
Frequency Response:	See curve in Figure 4-1.

3. **Ohms Conventional:**

Ranges:	RX1, RX100, RX1k and RX10k
Ohms Center:	6, 600, 6000, and 60k ohm
Maximum Scale Reading:	1000 ohms (RX1)
Accuracy:	±2.5 of an arc on the RX1 range; ±2.0 of arc on all other ranges. The nominal open circuit voltage for all ranges up to RX1k is 1.5V. The RX10k range has an open circuit voltage of 9V. The maximum current drawn from the 1.5V battery is 250 mA (RX1 with test leads shorted).

4. **Low Power Ohms**

Ranges:	RX1 and RX10
Ohms Center:	20 and 200 ohms
Maximum Scale Reading:	1000 ohms (RX1)
Accuracy:	±2.5 of arc on the RX1 range. The maximum open-circuit voltage for the Low Power Ohms ranges is 100 mV and the maximum measuring power is 0.125 mW. The battery quiescent current is 4.3 mA at RX1 and 0.43 mA at RX10.

5. **DC Current:**

Range (Full Scale)	Voltage Drop	Accuracy	Internal Resistance
0-50 μA	250 mV	±1.5% of F.S.	5000 Ω
0-0.5 mA	250 mV	±2.0% of F.S.	500 Ω
0-5 mA	252 mV	±2.0% of F.S.	50.4 Ω
0-50 mA	252 mV	±2.0% of F.S.	5.04 Ω
0-500 mA	480 mV	±2.0% of F.S.	.8 Ω
0-5A	250 mV	±2.0% of F.S.	.05 Ω

6. Output Jack:

Voltage (AC)

Ranges (Full Scale): 2.5V, 10V, 25V, 100V, 250V

Frequency Response: See curves in Figure 4-2.

Decibels (dB)

Range (AC)	Range (dB)	Ref: 1 mW into 600Ω = 0 dB
2.5V	Read Direct	(0.775V)
10V	Add 11 dB to reading	
25V	Add 19 dB to reading	
100V	Add 31 dB to reading	
250V	Add 39 dB to reading	

Accuracy: ±1.0 dB at the zero dB point

7. Rated Circuit-To-Ground Voltage* (float potential): 1000 VDC or 1000 Vrms

8. Readout: 4½ inch, 50 μA (full scale) tautband meter.

9. Fuse Protection: A 1 ampere 250V fuse is provided to protect the 260 circuits from misuse on the ohmmeter ranges and from excessive overloads on the milliampere ranges. A spare fuse is furnished with the 260. Both fuses are located in the battery and fuse compartment. An additional 2-ampere 600V fuse is provided to interrupt high fault current during accidental high energy overload. This fuse is located under the Instrument panel and enclosed by the cover.

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* *Per ANSI 39.5 April 1974: "The maximum voltage, with respect to ground, which may safely and continuously be applied to the circuit of an instrument."*

10. Movement Overload Protection:	In addition to the fuse, a varistor protects the indicating instrument circuit. In the event of overload, the varistor limits the current through the moving coil. The fuse and varistor will prevent serious damage to the 260 in most cases of accidental overload. However, no overload protection system is completely foolproof and misapplication, when working with high voltage circuits, can damage the Instrument.
11. Power Requirements:	Two Batteries: One 1.5V cell, NEDA 13F. One 9.0V alkaline cell, NEDA 1604 . Refer to Paragraph 5.2 for installation instructions.
12. Fuses:	1 Ampere , 250 Volts, type 3AG; 2 Amperes, 600 Volts, Bussman BBS or KTK
13. Dimensions:	5¼" wide x 7" long x 3⅛" high (133 x 178 x 79 mm)
14. Weight:	2½ pounds (1.14 kg)

Table 1-2. Items and Accessories Furnished With This Instrument

Quantity	Description	Number
1	Test Lead Set-One red and one black (4 ft. long) each with combination probe tip and removable rubber-sleeved alligator clip at one end and banana plug on opposite end.	00125
*1	1.5 volt, D Cell, NEDA 13F	
*1	9.0 volt Cell, NEDA 1604	
1	Operator's Manual	6-110935

**Batteries are standard items replaceable from local retail stores.*

Table 1-3. Additional Accessories

Description	Cat. No.
Utility Vinyl Case	00549
Leather Case	01818
Ever-Ready Leather Case	00805
Deluxe Carrying Case	00812

1.5 DEFINITION OF ACCURACY

1.5.1 The voltage and current accuracy of this instrument is commonly expressed as a percent of full scale. This should not be confused with accuracy of reading (indication). For example, $\pm 2\%$ of full scale on the 10 volt range allows an error of ± 0.20V at any point on the dial. This means that at full scale, the accuracy of reading would be $\pm 2\%$, but at half scale it would be $\pm 4\%$. Therefore, it is advantageous to select a range which gives an indication as near as possible to full scale.

1.6 SAFETY CONSIDERATIONS

1.6.1 This Operator's Manual contains cautions and warnings alerting the user to hazardous operating and service conditions. This information is flagged by CAUTION or WARNING headings throughout this publication, where applicable, and is defined at the front of the manual under SAFETY SYMBOLS. To ensure the safety of operating and servicing personnel and to retain the operating conditions of the instrument these instructions must be adhered to.

SECTION II
INSTALLATION

2.1 GENERAL

2.1.1 This section contains information and instructions for the installation of the 260-6XL and 6XLM. Included are unpacking and inspection procedures, warranty, shipping, power source requirements, operating position and care.

2.2 UNPACKING AND INSPECTION

2.2.1 Examine the shipping carton for any sign of damage. Inspect the Instrument and packing material for obvious damage from mechanical shock, water leakage, or other causes. Check the electrical performance as soon as possible. If there is any indication of damage, file a complaint with the carrier immediately. Also check that all accessories are included (Table 1-2). Save the shipping carton and packing materials for future storing or shipping of the Instrument.

2.2.2 After unpacking the Instrument, a 1.5V battery and a 9V battery will be found packed in separate envelopes in the box with the Instrument and test leads. Two alligator clips for the test leads, are also packed in a polyethylene bag. (Refer to Section V for instructions on how to open the battery compartment and install the batteries.) A pair of test leads, one black and one red, are also included.

2.3 WARRANTY

2.3.1 The Simpson Electric Company warranty policy is printed on the inside cover of this manual. Read it carefully prior to requesting a warranty repair.

> **NOTE:** For assistance of any kind, including help with the Instrument under warranty, contact the nearest Authorized Service Center for instructions. (These centers are listed on the last pages of this manual.) If it's necessary to contact the factory directly, give full details of the difficulty, including the Instrument model number, serial number, and date of purchase. Service data or shipping instructions will be mailed promptly. If non-warranty or other service work is required, an estimate of the maximum charge will be quoted. This charge will not be exceeded without prior approval.

2.4 SHIPPING

2.4.1 Pack the Instrument carefully and ship it prepaid to the proper destination. Insure the Instrument.

2.5 POWER SOURCE REQUIREMENTS

2.5.1 There are two batteries in the ohmmeter circuits. One is a NEDA 13F D size cell that furnishes 1.5 volts for all ranges up to RX1K. A NEDA 1604 battery furnishes 9 volts for the RX10K

range; it also is used by the overload sensing unit. The 1.5 volt D cell is held in place with two spring contact clips. Be sure to observe correct polarity when replacing the 1.5 volt D cell. The 9 volt battery is held in place with a spring clip but contact is made with a polarized connector.

2.6 OPERATING POSITION

2.6.1 The Instrument may be set horizontally on its rubber feet or vertically on its back and operated in either position. The Instrument can also be set at an inclined angle by positioning the carrying handle under the unit.

2.7 CARE

2.7.1 Immediately clean all spilled materials from the Instrument and wipe dry. If necessary, moisten a cloth with soap and water to clean plastic surfaces.

2.7.2 When the Instrument is not in use, rotate the range selector switch to the OFF/TRANSIT position.

2.7.3 Whenever possible, avoid exposure or usage in areas which are subject to temperature and humidity extremes, vibration, mechanical shock, dust, corrosive fumes, or strong electrical or electromagnetic interferences.

2.7.4 Monthly Care: Verify Instrument accuracy by performing operational checks using known, accurate, stable sources. If proper calibration equipment is not available, contact your nearest Simpson Authorized Service Center. (Refer to last pages of this manual.) If the Instrument has not been used for 30 days, check the batteries for leakage and replace if necessary.

2.7.5 Annual Care: It is recommended that the Instrument be

returned annually to an Authorized Service Center or the factory for a complete overall check and calibration.

2.7.6 Storage: When the Instrument is not in use, store it in a location free from temperature extremes, dust and corrosive fumes, and mechanical vibration or shock.

SECTION III

CONTROLS, CONNECTORS, AND INDICATORS

3.1 GENERAL

3.1.1 All operating and adjustment controls, connectors, and indicators are described in this section along with a list (Table 3-1) describing their function. Become familiar with each item prior to operating the instrument.

3.2 FRONT PANEL

3.2.1 The 260 s have a large, easy-to-read 4½" indicating instrument. Below the indicating instrument are three controls and seven circuit jacks. Switch positions and circuit jacks are marked in white, blue, green, and red characters which are printed on a sub-surface vinyl panel overlay. The colors on the overlay correspond to the dial graphics.

Table 3-1. Controls and Connectors

1. **Range Switch:**	The range switch has 18 positions. It may be turned to any position from either direction. There are seven voltage positions, four direct current positions, six resistance positions and an OFF/TRANSIT position. Two of the resistance positions are for "Low Power Ohms."
2. **Function Switch:**	The function switch has three positions: —DC, +DC and AC. To measure DC current or DC voltage, set the function switch at —DC or +DC, depending on the polarity of the signal applied across the test leads. For resistance measurements, the switch may be in either the +DC or —DC position. The function switch can reverse the test leads without need for removing the test leads from the circuit under test. To measure AC voltage, put the function switch into its AC position.

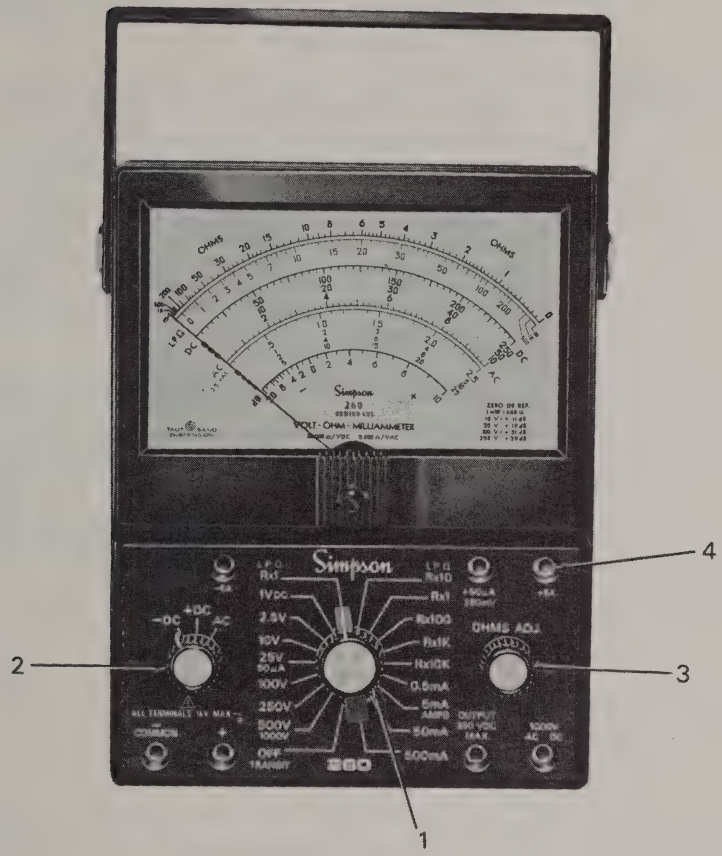

Figure 3-1. Simpson 260-6XL, Front Panel

3. **Ohms Adjust:** The ohms adjust control is a variable resistor in the ohmmeter circuit, which permits adjustment at infinity (∞) and at "0" for the low-power and conventional ohms ranges, respectively.

4. **Circuit Jacks:** There are seven jacks, located on the front panel. These are the connections for the test leads. The elbow prods of the test leads are plugged into the proper jacks for the circuit and range desired for each application. At the lower left are —COMMON and + jacks. The black test lead is connected to —COMMON for all circuits and ranges except the 5 amperes DC range. The red test lead is used in the +jack for all functions and ranges except, those designated by the other jacks. Across the top of the panel are three jacks individually marked —5A, dual-marking of +50 μA/250 mV at a single jack, and +5A.

For the 50 microampere or 250 millivolt DC range, the red test lead is connected to this dual-marked jack. For the 5 ampere DC range, the black test lead and the red test lead are connected to the —5A and +5A jacks, respectively. At the lower right are the OUTPUT and 1000V jacks. For all OUTPUT ranges, and for 1000 volts AC or DC, the red test lead is connected to the appropriate jack with the black lead in the —COMMON jack.

SECTION IV
OPERATION

WARNING

Before proceeding with the operation of the 260, review the SHOCK HAZARD definition printed on page viii of the manual. Also, do not use this Instrument and its accessories on induction heating, X-ray machines, or power sub-stations where high voltage and low impedance equipment is used.

4.1 GENERAL

4.1.1 This section of the manual contains information required to use and operate the 260 in a safe and proper manner.

4.2 SAFETY PRECAUTIONS

4.2.1 The 260 should only be used by personnel qualified to recognize shock hazards and trained in the safety precautions required to avoid possible injury.

4.2.2. Do not work alone when making measurements of circuits where a shock hazard might exist. Notify a nearby person that you are making, or intend to make such measurements.

4.2.3 Locate all voltage sources and accessible current paths before making measurement connections. Be sure the equipment is properly grounded and the right rating and type of fuse(s) is installed. Set the Instrument to the proper range before applying power.

REMEMBER: Voltage might appear unexpectedly in defective equipment. An open bleeder resistor can result in a capacitor's retaining a dangerous charge. Turn the power off and discharge all capacitors before connecting or disconnecting the Instrument.

4.2.4 Inspect the test leads for cracks, breaks or crazes in the insulation, prods, and connectors before each use. If any defects are noted, replace the test leads immediately.

4.2.5 Do not make measurements in a circuit where corona is present. Corona can be identified by a pale blue color emanating from sharp metal points in the circuit, or by a buzzing sound, or by the odor of ozone. In rare instances, such as around germicidal lamps, ozone might be generated as a normal function. Ordinarily, the presence of ozone indicates the presence of high voltage and probably an electrical malfunction.

4.2.6 Hands, shoes, floor, and workbench must be dry. Avoid making measurements under humid, damp, or other environmental conditions that could affect the dielectric withstanding voltage of the test leads or Instrument.

4.2.7 For maximum safety, do not touch test leads, or Instrument while power is applied to the circuit under test.

4.2.8 Use extreme caution when making measurements where a dangerous combination of voltages could be present, such as in an r-f amplifier.

4.2.9 Do not make measurements using test leads of lesser safety than those originally furnished with the Instrument.

4.2.10 Do not touch any object which could provide a current path to the common side of the circuit under test or powerline ground. Always stand on a dry, insulated surface capable of withstanding the voltage being measured.

4.3 ADJUST POINTER FOR ZERO

4.3.1 With the Instrument in operating position, check that the pointer indicates zero at the left end of the scale when there is no input. If pointer is off zero, adjust the screw located in the case below center of the dial. Use a small screwdriver to turn the screw slowly clockwise or counterclockwise until the pointer is exactly over the zero mark at the left end of the scale. With the indicating pointer set on the zero mark, reverse the direction of rotation of the zero adjuster. Rotate the zero adjuster a sufficient amount to introduce mechanical freedom or "play" but insufficient to disturb the position of the indicating pointer. This procedure will avoid disturbances to the zero setting by subsequent changes in temperature, humidity, vibration and other environmental conditions.

4.4 POLARITY CORRECTION

4.4.1 When making DC measurements with the test leads connected to the + and —COMMON jacks, polarity can be reversed with the function switch without reversing the test leads. When making measurements on the 50 μA/250 mV range, or 5A range, polarity can be corrected only by reversing the test leads.

NOTE: Change the range switch or function switch positions only when the power to the circuit being measured is turned off or when the test leads are disconnected. In addition to safety, this

practice will eliminate arcing at the switch contacts and prolong the life of the Instrument.

4.5 DC VOLTAGE MEASUREMENT

WARNING

Prior to making voltage measurement, review the SAFETY PRECAUTIONS listed in paragraph 4.2.

4.5.1 Measuring DC Voltage: 0-250 millivolts

CAUTION

When using the Instrument as a millivoltmeter, care must be taken to prevent excessive voltage from damaging it. Before using the 250 millivolt range, first use the 1.0 volt DC range to affirm that the voltage measured is no greater than 250 millivolts.

a. Set the function switch at +DC.

b. Plug the black test lead into the —COMMON jack and the red test lead into the +50 μA/250 mV jack.

c. Set the range switch at the 25V (50 μA) position.

d. Connect the black test lead to the negative side of the circuit being measured and the red test lead to the positive side of the circuit.

e. Turn power on and read the voltage on the black scale marked DC and use the figures marked 0-250. Read directly in millivolts.

f. Turn the power off and disconnect the test leads. Return the range switch to the OFF/TRANSIT position.

4.5.2 Measuring DC Voltage: 0-1 through 0-500 volts

a. Set the function switch to +DC.

b. Plug the black test lead into the —COMMON jack and the red test lead into the + jack.

c. Set the range switch at one of the seven voltage range positions marked 1V, 2.5V, 10V, 25V, 100V, 250V or 500V. When in doubt about the approximate voltage present, always use a sufficiently high voltage range to protect the Instrument. If the voltage reading is within the limits of a lower range, the switch then may be set to that range to obtain a more accurate reading.

d. Be sure the power is off in the circuit being measured and all capacitors have been discharged.

e. Connect the black test lead to the negative side of the circuit being measured and red test lead to the positive side of the circuit.

f. Turn on the power of the circuit and read the voltage on the black scale marked DC. For the 2.5V and 25V ranges, use the 0-250 figures and divide the reading by 100 and 10 respectively. For the 10V, and 250V ranges, read the 0-10 and 0-250 figures directly. For the 500V range, use the 0-50 figures and multiply the reading by 10. For the 100V range use the 0-10 figures and multiply by 10. For the 1V range, use the 0-10 figures and divide by 10.

g. Turn the power off, disconnect the test leads and return the range switch to the OFF/TRANSIT position.

4.5.3 Measuring DC Voltage: 0-1000 Volts

WARNING

Use extreme care when working with high voltage circuits. For maximum safety, avoid touching the Instrument or test leads while power is on in the circuit being measured.

a. Set the function switch at +DC.

b. Set the range switch at 1000V (dual position with 500V).

c. Be sure the power is off in the circuit being measured and all capacitors have been discharged.

d. Plug the black test lead into the —COMMON jack and the red test lead into the 1000V jack. Connect the black test lead to the negative side of the circuit being measured and the red test lead to the positive side.

e. Turn on power in the circuit being measured.

f. Read the voltage on the black scale marked DC, using the 0-10 figures. Multiply the reading by 100.

g. Turn the power off, disconnect the test leads and return the range switch to the OFF/TRANSIT position.

4.6 AC VOLTAGE MEASUREMENT

WARNING

Prior to making voltage measurements, review the SAFETY PRECAUTIONS listed in paragraph 4.2.

4.6.1 Measuring AC Voltage

NOTE: The Simpson 260-6XL and 6XLM respond to the full-wave average value of an AC waveform. They are calibrated in terms of the rms value of a pure sine wave. If the waveform is non-sinusoidal, the reading might be either higher or lower than the true rms value, and could result in a substantial error. Also, accuracy is lessened at higher input frequencies (Figure 4-1).

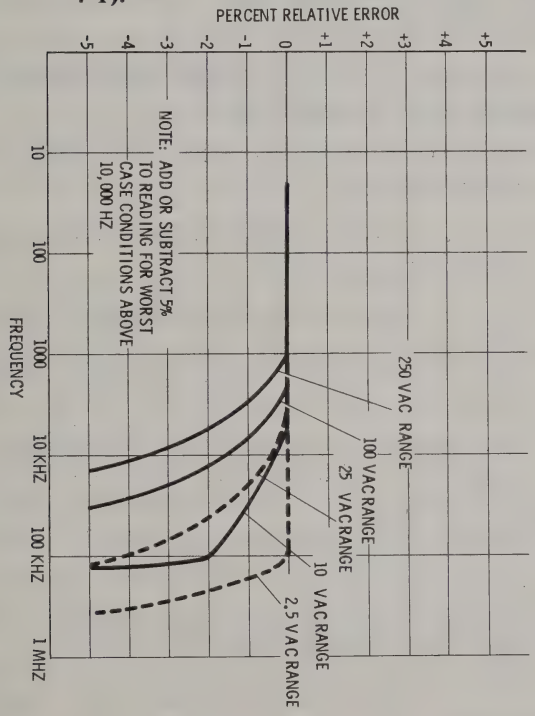

Figure 4-1. Typical Frequency Response, AC Voltage Ranges

a. Set the function switch at AC.

b. Set the range switch at one of the six voltage range positions marked 2.5V, 10V, 25V, 100V, 250V or 500V. When in doubt about the approximate voltage in the circuit being measured always use a sufficiently high voltage range as a protection to the Instrument. If the voltage is within a lower range the switch then may be set at a lower range to obtain a more accurate reading.

c. Plug the black test lead into the —COMMON jack and the red test lead into the + jack.

d. Be sure the power is off in the circuit being measured and all the capacitors have been discharged.

e. Connect the test lead across the voltage source with the black lead on the ground side.

f. Turn on the power in the circuit being measured and read the voltage on the red scale marked AC.

g. For the 0-2.5V range, read the value directly on the red scale marked 2.5 VAC. For the 10V, 25V, 100V, 250V and 500V ranges, read the red scale marked AC and use the black figures immediately above the scale. For the 10V and 250V ranges, read directly using the 0-10 and 0-250 figures respectively. For the 500V range, read directly on the 0-50 figures and multiply the reading by 10. For the 100V range, read directly the 0-10 figures and multiply the reading by 10. For the 25V range, use the 0-250 figures and divide by 10.

h. Turn power off, disconnect the test leads and return the range switch to the OFF/TRANSIT position.

4.6.2 Measuring AC Voltage: 0-1000 Volts

WARNING

For maximum safety, avoid touching the Instrument or the test leads while the power is on in the circuit being measured.

a. Set the function switch at AC.

b. Set the range switch at 1000V (dual position with 500V).

c. Plug the black test lead into the —COMMON jack and the red test lead into the 1000V jack.

d. Be sure the power is off in the circuit being measured and that all its capacitors have been discharged. Connect the test leads to the circuit with the black lead on the ground side.

e. Turn on the power in the circuit being measured.

f. Read the voltage on the red scale marked AC. Use the 0-10 figures and multiply by 100.

g. Turn power off, disconnect the test leads and return the range switch to the OFF/TRANSIT position.

4.6.3 Output Voltage and Decibel Measurements

(1) Measuring Output Voltage:

Often it is necessary to measure the AC component of a voltage consisting of a mixture of AC and DC voltages, as in amplifier circuits. The 260's have a 0.1 μf, 400 volt capacitor in series with the OUTPUT jack. The capacitor blocks the DC component of the voltage in the test circuit, but passes the AC component. The blocking capacitor alters the AC response

of each Instrument at low frequencies. (Figure 4-1 for frequency response.)

CAUTION

When using the OUTPUT mode, do not connect the Instrument to a circuit whose DC voltage component exceeds 350 volts.

a. Set the function switch at AC.

b. Plug the black test lead into the —COMMON jack and the red test lead into the OUTPUT jack.

c. Set the range switch at one of the range positions marked 2.5V, 10V, 25V, 100V or 250V.

d. Be sure the power is off in the circuit being measured.

e. Connect the test leads across the circuit being measured with the black test lead to the ground side.

f. Turn on the power in the test circuit. Read the output voltage on the appropriate AC voltage scale. For the 0-2.5V range, read the value directly on the red scale marked 2.5V. For the 10V, 25V, 100V or 250V ranges, use the red scale marked AC and read the black figures immediately above the scale.

(2) Measuring Decibels:

To read voltages in terms of decibels, use the decibel dB scale on the bottom of the dial, marked from —20 to +10. Read the dB scale by first following the instructions for measuring AC. When the range switch is set on the 2.5V position, read the dB scale directly. The dB readings on the scale are re-

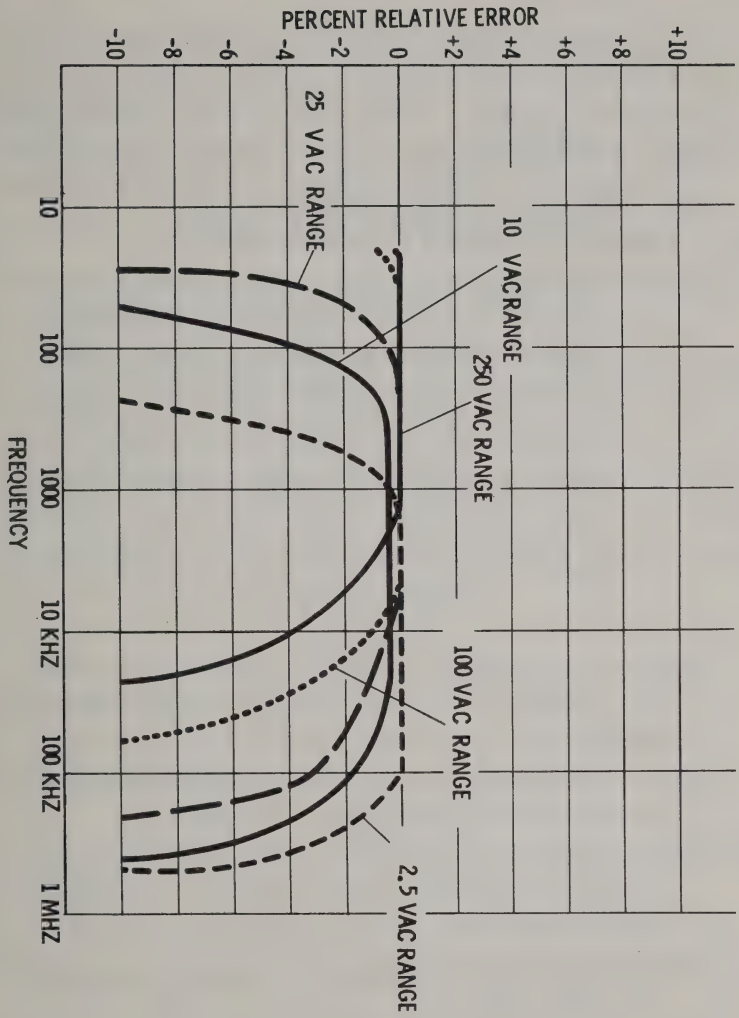

Figure 4-2. 260-6XLP Typical Frequency Response, Output Ranges

ferenced to zero dB power level of 0.001 watt into 600 ohms, or 0.775 VAC across 600 ohms. For the 10V range, read the dB scale and add +11 dB to the reading. For the 25V range, read the dB scale and add 19 dB to the reading. On the 100V range, read the dB scale and add +31 dB to the reading; on the 250V range, add +39 dB to the reading.

4.7 DIRECT CURRENT MEASUREMENT

NOTE: The voltage drop across the 260-6XL on all milliampere current ranges is approximately 250 millivolts measured at the jacks. An exception is the 0-500 mA range, where the drop is approximately 480 millivolts. The voltage drop will not affect most circuits whose current is being measured. In some transistor circuits, it might be necessary to take the voltage drop into account when making voltage measurements.

WARNING

- Do not change the range setting of the Range or Function Switches while the circuit under measurement is energized.
- **Never disconnect the test leads** from the circuit under measurement while the circuit is energized.
- Always turn the power off and discharge all the capacitors before the setting of the switches is changed, or the leads disconnected.
- Always connect the Instrument in series with the ground side of the circuit.
- Never exceed the Circuit-To-Ground voltage of the Instrument (1000V max; Table 1-1, item 7).

4.7.1 Measuring Direct Current: 0-50 Microamperes

a. Set the function switch at +DC.

b. Plug the black test lead into the —COMMON jack and the red test lead into the +50 μA/250V jack.

c. Set the range switch at the 25V (50 μA) position.

d. Be sure the power is off in the circuit being measured and all capacitors are discharged.

e. Open the circuit in which the current is to be measured. Connect the red test lead at the positive side and the black test lead at the negative side.

f. Turn the power on and read the current on the black DC scale. Use the 0-50 figures to read directly in microamperes.

g. Turn the power off, disconnect test leads and return the range switch to the OFF/TRANSIT position.

> **NOTE:** In all direct current measurements, be certain the power to the circuit being tested has been turned off before connecting/disconnecting test leads and restoring circuit continuity.

4.7.2 Measuring Direct Current: 0-0.5 through 0-500 Milliamperes

a. Set the function switch at +DC.

b. Plug the black test lead into the —COMMON jack and the red test lead into the + jack.

c. Set the range switch at one of the four range positions marked

0.5 mA, 5 mA, 50 mA or 500 mA.

d. Turn the power off, discharge all capacitors, and open the circuit in which the current is being measured. Connect the Instrument in series with the circuit. Connect the red test lead to the positive side and the black test lead to the negative side.

e. Turn on the power to the circuit under test.

f. Read the current in milliamperes on the black DC scale marked 0-50. For the 0.5 mA or 5 mA ranges, divide the reading by a factor of 100 or 10, respectively. Read the 50 mA range directly. Multiply the reading on the 500 mA range by a factor of 10.

g. Turn power off, disconnect test leads and return the range switch to the OFF/TRANSIT position.

4.7.3 Measuring Direct Current: 0-5 Amperes

a. Plug the black test lead into the —5A jack and the red test lead into the +5A jack.

b. Set the range switch at 5 AMPS (dual position with 5 mA).

c. With power OFF, open the circuit in which the current is being measured. Connect the Instrument in series with the circuit. Connect the red test lead at the positive side and the black test lead at the negative side.

d. Turn on power in the circuit under test.

NOTE: The function switch has no effect on polarity for the 5 AMPS range.

e. Read current directly on the black DC scale. Use the 0-50 figures; divide by 10 to read amperes.

f. Turn power off and disconnect the test leads. Return the range switch to the OFF/TRANSIT position.

4.8 RESISTANCE MEASUREMENTS

WARNING

Before making resistance measurements, remove all power to the circuit under test. Discharge all capacitors.

4.8.1 The 260's have six resistance ranges. Two are "Low Power Ohms" and the other four are conventional ohm ranges powered by two batteries. The "Low Power Ohms" ranges are used for accurate and safe measurements of resistance in semiconductor and integrated circuits. The low open-circuit voltage of 100 millivolts assures that the circuit being measured will not be damaged or have its resistance affected by conducting diodes. Depending on the range selected, the open-circuit voltage for the conventional ohms ranges is 1.5V or 9V.

4.8.2 A single OHMS ADJ. control is provided for all the resistance ranges. This control compensates for variations in battery voltage and allows the user to zero the Instrument prior to measuring resistance.

4.8.3 Measuring Resistance: Using low Power Ohms Ranges

a. Turn the range switch to the desired resistance range marked in blue. Turn the function switch to either the —DC or +DC position.

b. Plug the black test lead into the —COMMON jack and the red test lead into the +jack.

c. With the test leads separated, rotate the OHMS ADJ control

to set the Instrument pointer at infinity (∞) on the blue Low Power Ohms arc. If the pointer cannot be adjusted to infinity (∞), replace the 1.5V battery. Refer to paragraph 5.4 for instructions.

d. Connect the test leads to the circuit whose resistance is to be measured. Read the resistance on the blue arc and multiply it by the factor indicated on the range switch.

e. Disconnect the test leads and return the range switch to the OFF/TRANSIT position.

NOTE: When the Instrument is not in use, never leave the range switch in the "Low Power Ohms" position because power is drawn continuously for the 1.5V battery.

4.8.4 Measuring Resistance: Using Conventional Ohms Ranges

a. Turn the Range switch to the desired range and the function switch to either the +DC or —DC position.

b. Plug the black test lead into the —COMMON jack and the red red test lead into the +jack.

c. Connect the ends of the test leads to short-circuit the Instrument's resistance measuring circuit.

d. Rotate the OHMS ADJ control to set the Instrument pointer to "0" on the black ohms arc. If the pointer cannot be adjusted to "0," replace the 1.5V battery. Replace the 9V battery if the RX10K range cannot be adjusted to full-scale (zero ohms). For battery replacement (refer to paragraph 5.3).

e. Disconnect ends of test leads and connect to component being measured.

f. Read the resistance on the black ohms scale. Multiply the reading by the factor indicated on the range switch.

g. Disconnect ends of test leads and return the range switch to the OFF/TRANSIT position.

SECTION V

OPERATOR SERVICING

5.1 GENERAL

5.1.1 The Simpson 260-6XL and 6XLM have been designed carefully and constructed with high-quality components. By providing reasonable care, and following the instructions in this manual, the user can expect a long useful service life from these Instruments.

WARNING

Prior to opening the Battery compartment Cover, Disconnect the test leads from live circuits.

5.2 BATTERY AND FUSE REPLACEMENT

5.2.1 The batteries and 1-ampere fuse are located inside an isolated compartment at the top-rear of the Instrument case. To open the compartment, proceed as follows:

NOTE: If replacement of the 2-amp high current interrupting fuse is necessary, the Instrument case must be removed (see paragraph 5.4 and Figure 5-2).

a. Place the Instrument face down on a soft padded surface.

b. Unscrew the single captivated screw on the cover.

c. Remove the cover from the case and set it aside. Batteries and fuse now can be replaced.

5.2.2 Battery replacement is necessary: Whenever the Instrument cannot be adjusted to infinity (∞) with open test leads on the Low Power Ohmmeter ranges, or with shorted test leads on the conventional ohmmeter ranges. If these adjustments cannot be made, replace the 1.5V, D size cell. If the ohms adjustment cannot be made on the Rx10K range, replace the 9-volt battery.

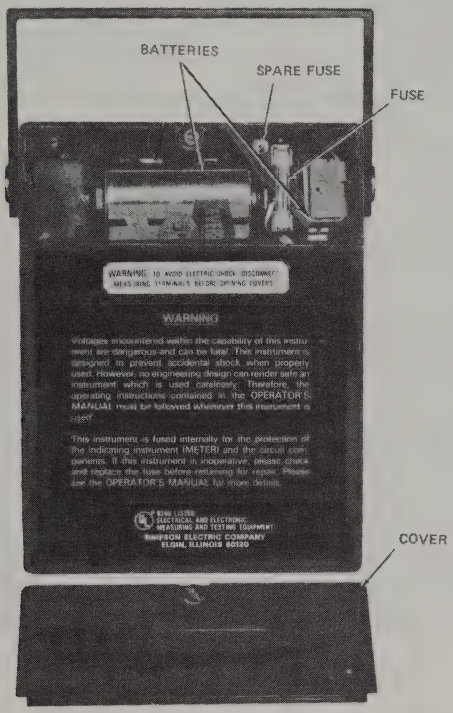

Figure 5-1. Battery and Fuse Compartment

5.2.3 The procedure for replacing batteries is as follows:

a. To remove the D size cell, grasp the battery at the center and pull directly up. To install new cell, insert the —end first: push against the —terminal spring clip, and then gently push the + side of the cell into place.

b. To remove the 9-volt battery, first withdraw battery with mating connector from the compartment.

c. Remove the connector from the old battery and connect it to new battery.

d. Put the new battery into the compartment.

e. Place the connector leads so they rest between the cavity walls and clear the fuse terminals. Place the extended leads between the battery holder and top wall of the case.

5.2.4 One-ampere or two-ampere fuse replacement is necessary when there is no meter deflection on any of the DC, AC VOLTS or OHMS ranges but the DC AMPS range operates properly.

5.2.5 The procedure for replacing the 1-ampere fuse is as follows:

a. Pull the defective fuse from its retaining spring clips (fuse holder).

b. Snap-in the replacement fuse and reinstall cover.

NOTE: A spare fuse is located in a cavity next to the fuse clip. Use only if proper replacement fuse is not available; **i.e.,** save the internal spare for an emergency.

5.3 CASE REMOVAL

5.3.1 Whenever maintenance other than battery and 1-ampere

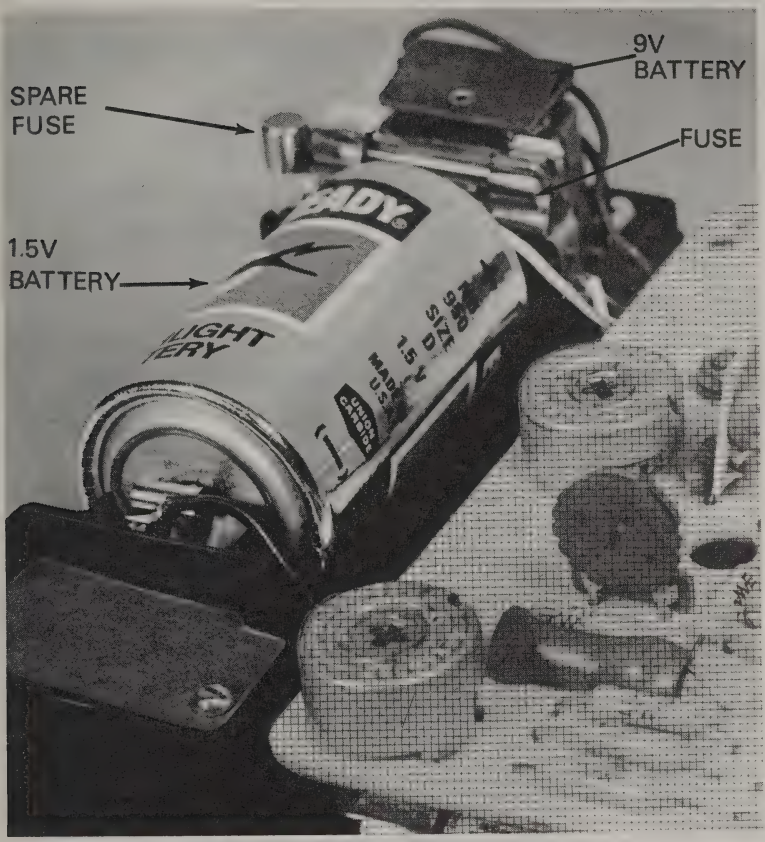

Figure 5-2. Rear Interior (Case Removed)

fuse replacement is required, remove the Instrument from its case. The procedure is as follows:

a. Place the Instrument face down on a soft padded surface.

b. Remove the Battery and Fuse compartment cover, located at the top rear of the 260 case (paragraph 5.3). Unscrew the four screws located at the four corners of the case.

c. Lift the case off the Instrument and set it aside. Maintenance now can be performed on the Instrument (Figure 5-2).

5.4 FUSE PROTECTION

5.4.1 A 1 Amp 250 Volt quick-acting and 2 Amp 600 Volt high interruption capacity fuse is connected in series with the input circuit as additional protection to the VOM against excessive energy fault current, such as a power line overload.

5.4.2 It is important to replace the 1 Amp fuse with a Littelfuse Type 312001 only to prevent the 2 Amp 600 Volt (Bussmann Type BBS or KTK) Fuse from opening on nominally high overload.

5.4.3 If the Instrument fails to indicate, the 1 Amp or the 2 Amp fuses may be burned out. (Refer to Paragraph 5.2 for fuse replacement.) A 1 Amp spare fuse is furnished with each Instrument. (Both 1 Amp fuses are located in the battery and fuse compartment.) The 2 Amp fuse is located on the instrument panel under the printed circuit board.

WARNING

These servicing instructions are for use by qualified personnel only. To avoid electrical shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so.

SECTION VI

SERVICING INSTRUCTIONS

6.1 GENERAL

NOTE: This instrument must be serviced by qualified personnel. To aid in troubleshooting a schematic diagram is enclosed. The accompanied parts list (Table 6-1) describes the components and refers to Simpson part numbers. Reference Symbol numbers correlate the components shown on the schematic diagram with the parts list.

6.1.1 The following information is provided as an adjunct to the overall text contained in this manual and should be read and understood thoroughly prior to ordering replacement parts for the Instrument.

6.2 REPLACEMENT PARTS AND SCHEMATIC DIAGRAM

6.2.1 To obtain replacement parts, address order to the nearest Authorized Service Center (listed on the last pages of this manual). Refer to paragraph 2.3.1 for ordering instructions.

Table 6-1. Replacement Parts

Reference Symbol	Description	Part No.
R-1	Potentiometer, 100KΩ	5-116715
R-2	Potentiometer, 2KΩ	5-116716
R-3	Potentiometer, 3KΩ	5-116717
R-4	Resistor, 5 MegΩ	5-110454

R-5	Resistor, 3 MegΩ	1-113432
R-6	Resistor, 1.5 MegΩ	1-113536
R-7	Resistor, 300KΩ	1-113995
R-8	Resistor, 150KΩ	1-117895
R-9	Resistor, 30KΩ	1-115042
R-10	Resistor, 15KΩ	1-113347
R-11	Resistor, 332Ω	5-116941
R-12	Resistor, 3.29kΩ	5-117112
R-13	Resistor, 505 Ω	5-116731
R-14	Resistor, 45.5 Ω (Bobbin)	10-675462
R-15	Resistor, 4.5 Ω (Bobbin)	10-675264
R-16	Resistor, 0.45 Ω (Bobbin)	10-675463
R-17	Resistor, 0.05 Ω Shunt, 5A (Calibrate in VOM)	3-812003
R-18	Resistor, 7.5 MegΩ	5-111668
R-19	Resistor, 2.5 MegΩ	5-111669
R-20	Potentiometer (Dual) 600 Ohms Front, 10KΩ Rear	5-116752
R-21	Resistor, 1.6KΩ	5-116289
R-22	Resistor, 22.3 Ω (Wirewound)	5-119565
R-23	Resistor, 286 Ω	5-117111
R-25	Resistor, 8.2KΩ	1-118612
R-26	Resistor, 54.2KΩ	5-116725
R-27	Resistor, 3.47KΩ	5-116753
R-28	Resistor, 1.84KΩ	5-116723
R-29	Resistor, 4.68KΩ	5-116718
R-30	Resistor, 89.5 Ω	5-116722
R-31	Resistor, 515 Ω	5-116732
R-32	Resistor, 5 Ω, 5W (Wire Wound)	5-119566
R-33	Resistor, 3Ω (Bobbin)	10-675466
R-34	Resistor, 1.25 MegΩ	5-115068
R-35	Resistor, 750KΩ	5-116726

R-36	Resistor, 375KΩ	1-113364
R-37	Resistor, 75KΩ	1-117258
R-38	Resistor, 37.5KΩ	5-116719
R-39	Resistor 7.5KΩ	5-116678
R-40 R-43	Potentiometer, 3KΩ	5-116714
R-41 R-42	Resistor, 4KΩ	5-114835
C-1	Capacitor, 0.1 μF, 400V	1-113733
D-1 D-2	Diode, Germanium	5-115665
F-1	Fuse, 1 Amp, 250V 3AG (1¼" x ¼") Quick Acting	1-112507
F-2	Fuse, 2 Amp, 600V Bussmann BBS or KTK	5-119056
	Ohms Adjust	10-863470
	Function Switch, Knob	10-863468
	Range Switch, Knob	10-863465
	Case Assembly, Complete (Including Handle, Less Battery Compartment Cover)	10-862883
	Battery Compartment Cover Assembly	10-560212
	Carrying Handle for Case	5-116711
	Rubber Bumper Plug	5-115039
	Overlay	6-110931
	Indicating Instruments with:	
	Panel Assembly 260-6XL	D13725
	260-6XLM	D13726
	Cover Assembly for Indicating Instrument	10-560217
	Combination Probe Tip Leads, One Red and One Black with Removable Alligator Clips	00125

Label, UL Listing	6-110977
Label, Operator Servicing	6-110960
Label, Battery and Fuse Data	6-110957
Label , Warning	6-111474

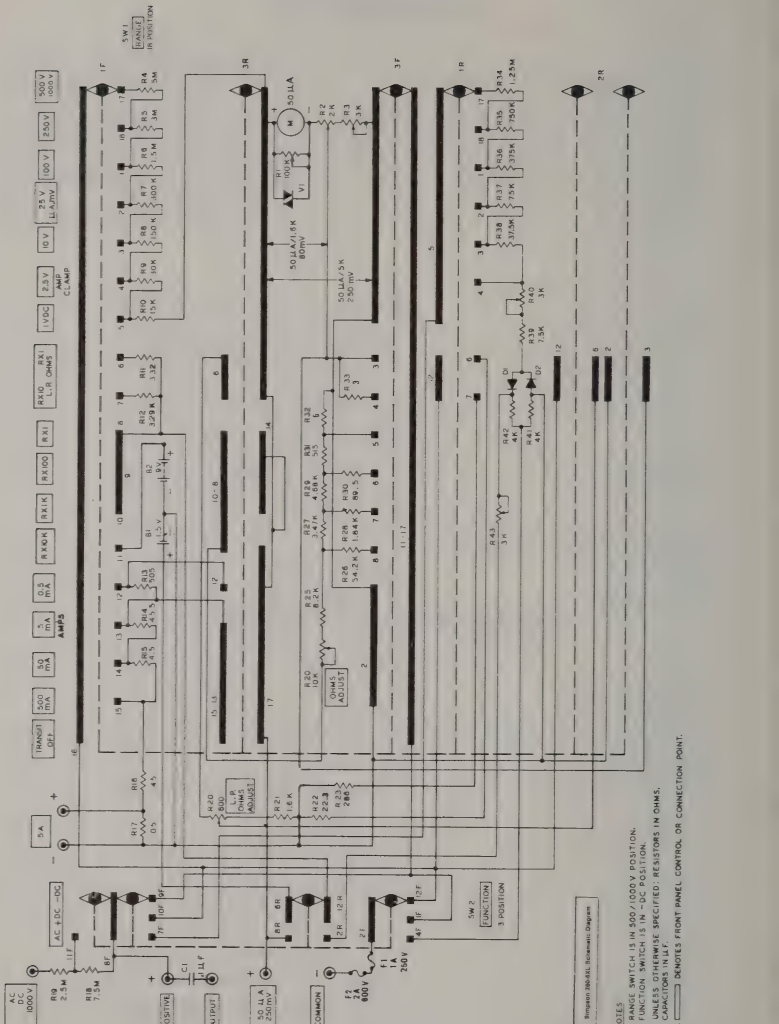

Figure 6-1. Schematic Diagram

AUTHORIZED SERVICE CENTERS

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853 Dundee Avenue, Elgin, Illinois 60120 — Phone: (312) 697-2260

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Tel. 907/277-1497

★ALASKA, ANCHORAGE 99500
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☐ E.I.L. INSTRUMENTS INC.
6212 Peachtree St.
Tel. 213/685-7020

★★★CALIFORNIA, GLENDALE 91201
☐ WEATHERFORD INSTRUMENT DIV.
WESTERN ELECTRONIC SUPPLY CORP.
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3995 E. Bayshore Road
Tel. 415/968-0313

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☐ METERMASTER/SAN DIEGO
8799 Balboa Avenue
Tel. 714/560-4841

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INSTRUMENT LAB
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☐ FISHER-BROWNELL
3381 Edward Avenue
Tel. 408/988-6041

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☐ ETALON COMPANY
1323 Huntington Drive
Tel. 213/257-5410

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CORPORATION
1165 S. Cherokee
Tel. 303/722-5766

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Tel. 808/847-1138

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7170 Manchester
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INDUSTRIAL ELECTRONICS & AUTOMATION COMPANY
2500 Grand Avenue
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ELECTROMETRICS COMPANY
404 South 11th
Tel. 402/477-3434

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3500 Bleachery Place
Tel. 315/737-7328

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MOHAWK COMMUNICATIONS
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Tel. 919/781-5256

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